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SUSTAINABLE DEVELOPMENT: TRADE AND ENVIRONMENT - THE IMPACT OF ENVIRONMENT-RELATED POLICIES ON EXPORT COMPETITIVENESS AND MARKET ACCESS

Report by the UNCTAD secretariat

Addendum

STATISTICAL ANNEX

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CONTENTS

		Page
Introduction		3
Part I	Environmental investments as a percentage of GDP	4
Part II	Pollution abatement expenditures and operating costs for selected countries	5
Part III	Pollution control capital expenditures for selected OECD countries	10
Part IV	Trade in products from sectors with high pollution abatement costs	11
Part V	Comparative advantage analysis	14
	A. Revealed comparative advantage indices (RCA): analysis of trade in products from sectors with high pollution abatement costs	14
	B. Competitiveness matrixes: ex-post indicators of competitiveness	15
Part VI	Trade in pollution abatement equipment	23

Introduction

This statistical annex has been prepared as a background document for the report by the UNCTAD secretariat on "The impact of environment-related policies on export competitiveness and market access" (TD/B/41(1)/4), to be considered by the Trade and Development Board at the first part of its forty-first session. The structure of the annex is as follows. Part I, II and III refer to issues concerning the cost of complying with domestic environmental regulations (see report TD/B/41(1)/4, sections III.B.1 and III.B.2). Part IV provides statistical data on trade in products from sectors with high pollution abatement costs. This issue was analysed in section III.B.3 of TD/B/41(1)/4 on the impacts of environmental regulations on trade and industry relocation. Part V analyses the export competitiveness of these products. It includes an analysis of revealed comparative advantage indices of products from sectors with high pollution abatement costs and ex-post indicators of their competitiveness. Part VI refers to section IV.B of report TD/B/41(1)/4 and provides an analysis of trade in pollution abatement equipment among selected regions.

PART I

Environmental investments as a percentage of GDP
(public and private sectors[1])

	1985	1987	1988	1989	1990
Developed countries:					
Austria	..	1.7	1.7	..	..
Canada	..	..	..	1.1	..
France	0.8	1.0	1.0	1.0	1.0
Germany[2]	1.5	1.6	1.6	1.6	1.6
Japan	..	1.1	1.1	1.1	1.1
Netherlands	1.5	1.5	..	1.5	..
Portugal	..	..	..	0.6	..
United Kingdom	1.3	..	..	..	1.5
United States	1.4	1.4	1.3	1.4	1.4
Developing countries:[3]					
China	0.5	0.8	0.7	0.7	0.6
Indonesia	..	..	..	0.4	..
Republic of Korea	0.4	..	..	..	..
Singapore	..	..	..	1.1	..
Thailand	0.2	..	..	..	..

Sources: UNCTAD, on the basis of OECD, "OECD Environmental data, Compendium 1993", page 294; Phantumvanit D, T. Panayotou "Industrialization and Environmental Quality: Paying the Price", Synthesis paper No. 3, 1990; and Ministry of Foreign Trade & Economic Cooperation, China.

PART II

Pollution abatement expenditures and operating costs for selected countries[4]

The following tables provide data on pollution abatement costs for manufacturing industries classified at a two-digit international standard industrial classification level (ISIC, revision 2) for selected developed countries.

An analysis and comparison of pollution abatement expenditures and operating costs is rendered difficult because of a number of factors:

- Expenditures on pollution abatement do not reflect all environmental costs and may therefore be under-reported. For example, costs of compliance for environmental zoning, delays from permitting requirements, workplace health and safety standards are not included.[5]

- The accuracy of reporting may differ among firms. For example, while only part of the investment on a technology is attributable to environmental regulations, the whole may be reported as an environmental expenditure. Firms may over-report, or under-report, pollution abatement expenditure and operating costs to influence regulations or to influence future investment decisions of the company. Also, pollution abatement costs can be classified as such, without being directly motivated by concerns for the environment but by profit maximizing business behaviour.[6]

- Pollution abatement equipment may be of two types: "environmentally sound technologies" or end-of-pipe solutions. While the former may reduce expenditures by cutting costs and by increasing efficiency, the latter will raise costs. Pollution abatement expenditures and operating costs do not reveal this differentiation.

- Differences in definitions and methodologies complicate the comparison of pollution abatement expenditures and operating costs. Moreover, not all countries are collecting this type of data. Despite these limitations, industry-level pollution abatement expenditures and operating costs may give a rough indication of differences in compliance costs across sectors and across countries.

ISIC code	Production activity: manufacturing industry:	Australia[7], 1990-91					
		Total investment	Pollution abatement capital investment		Value of production	Pollution abatement operating costs	
		million US$		%	million US$		%
31	Food, beverages, tobacco	..	..	..	..	..	..
32	Textile etc., leather	..	..	..	..	..	..
33	Wood etc., furniture	..	..	..	..	..	..
34	Paper, print, publishing	201.8	11.1	5.5	11248.1	14.9	0.1
35	Chemicals, petroleum, coal, rubber, plastics	995.0	103.5	10.4	23430.2	71.0	0.3
36	Non-met., minerals (except petroleum and coal)	828.0	15.4	1.9	5859.3	24.4	0.4
37	Basic metal industries	400.9	64.3	16.0	16820.3	66.8	0.4
38	Fabricated metal products, machinery and equipment	777.8	5.6	0.7	34607.3	12.3	0.0
39	Other manufacturing	..	..	..	..	..	..
3	Total manufacturing	3203.4	199.9	6.2	133580.4	189.5	0.1

ISIC code	Production activity: manufacturing industry:	Canada[8], 1989					
		Total investment	Pollution abatement capital investment		Value of production	Pollution abatement operating costs	
		million US$		%	million US$		%
31	Food, beverages, tobacco	..	..	..	..	..	..
32	Textile etc., leather	..	..	..	..	..	..
33	Wood etc., furniture	..	..	..	..	..	..
34	Paper, print, publishing	2015.2	310.8	15.4	26598.8	80.2	0.3
35	Chemicals, petroleum, coal, rubber, plastics	717.1	120.8	16.8	32125.8	66.7	0.2
36	Non-met., minerals (except petroleum and coal)	..	..	..	..	..	..
37	Basic metal industries	..	..	..	..	..	..
38	Fabricated metal products, machinery and equipment	956.9	242.4	25.3	19172.3	270.3	1.4
39	Other manufacturing	..	..	..	..	..	..
3	Total manufacturing	4710.3	750.8	15.9	275413.9	515.2	0.2

ISIC code	Production activity: manufacturing industry:	France[9], 1991					
		Total investment	Pollution abatement capital investment		Value of production	Pollution abatement operating costs	
		million US$		%	million US$		%
31	Food, beverages, tobacco	5576.7	..	..	..	..	..
32	Textile etc., leather	1534.5	19.9	1.3	..	..	..
33	Wood etc., furniture	1545.2	3.9	0.3	..	..	..
34	Paper, print, publishing	3555.8	119.5	3.4	..	..	..
35	Chemicals, petroleum, coal, rubber, plastics	7929.1	411.0	5.2	..	..	..
36	Non-met., minerals (except petroleum and coal)	1948.9	54.2	2.8	..	..	..
37	Basic metal industries	3030.8	141.0	4.7	..	..	..
38	Fabricated metal products, machinery and equipment	14695.1	106.3	0.7	..	..	..
39	Other manufacturing	..	85.4	..	..	..	..
3	Total manufacturing	39816.1	941.7	2.4	..	..	..

ISIC code	Production activity: manufacturing industry:	Germany (only ex FRG)[10], 1990					
		Total investment	Pollution abatement capital investment		Value of production	Pollution abatement operating costs	
		million US$		%	million US$		%
31	Food, beverages, tobacco	5235.5	169.0	3.2	127771.9	303.3	0.2
32	Textile etc., leather	1771.4	45.8	2.6	47968.7	..	..
33	Wood etc., furniture	..	78.0	..	30164.6	..	..
34	Paper, print, publishing	3703.0	190.0	5.1	..	..	..
35	Chemicals, petroleum, coal, rubber, plastics	..	1351.1	..	..	..	..
36	Non-met., minerals (except petroleum and coal)	2538.8	154.1	6.1	30826.3	..	..
37	Basic metal industries	2964.0	333.6	11.3	60531.0	612.7	1.0
38	Fabricated metal products, machinery and equipment	29112.5	716.1	2.5	520406.6	..	..
39	Other manufacturing	247.6	5.0	2.0	4968.7	..	..
3	Total manufacturing	58541.2	3042.6	5.2	1095702.8	4697.7	0.4

ISIC code	Production activity: manufacturing industry:	Japan[11], 1991-92					
		Total investment	Pollution abatement capital investment		Value of production	Pollution abatement operating costs	
		million US$		%	million US$		%
31	Food, beverages, tobacco	..	..	..	..	..	..
32	Textile (no leather products)	1259.4	13.9	1.1	..	..	..
33	Wood etc., furniture	..	..	..	..	..	..
34	Paper, print, publishing	1934.5	79.4	4.1	..	..	..
35	Chemicals, petroleum coal, rubber, plastics	14314.3	615.1	4.3	..	..	..
36	Non-met., minerals (except petroleum and coal)	931.7	25.2	2.7	..	..	..
37	Basic metal industries	10150.0	424.8	4.2	..	..	..
38	Fabricated metal products, machinery and equipment	28503.8	469.7	1.6	..	..	..
39	Other manufacturing	7902.1	61.9	0.8	..	..	..
3	Total manufacturing	64995.7	1689.9	2.6	..	..	..

ISIC code	Production activity: manufacturing industry:	Netherlands[12], 1992 (except for value of production - 1990)					
		Total investment	Pollution abatement capital investment		Value of production	Pollution abatement operating costs	
		million US$		%	million US$		%
31	Food, beverages, tobacco	1830.5	39.3	2.1	41450.7	72.6	..
32	Textile etc., leather	208.7	27.2	13.1	4418.0	11.5	..
33	Wood etc., furniture	142.7	4.6	3.2	3114.6	4.8	..
34	Paper, print, publishing	960.6	8.4	0.9	14501.0	31.6	..
35	Chemicals, petroleum, coal, rubber, plastics	2592.6	210.2	8.1	43532.6	338.1	..
36	Non-met., minerals (except petroleum and coal)	309.9	17.7	5.7	4579.5	21.4	..
37	Basic metal industries	315.0	42.3	13.4	6004.0	55.5	..
38	Fabricated metal products, machinery and equipment	2175.1	36.5	1.7	48845.6	72.4	..
39	Other manufacturing	..	..	..	388.4	3.1	..
3	Total manufacturing	8569.8	424.1	4.9	166834.2	610.9	..

ISIC code	Production activity: manufacturing industry:	Sweden[13], 1991					
		Total investment	Pollution abatement capital investment		Value of production	pollution abatement operating costs	
		million US$		%	million US$		%
31	Food, beverages, tobacco	659.4	34.7	5.3	15035.3	41.3	0.3
32	Textile etc., leather	83.0	1.0	1.2	1709.5	4.5	0.3
33	Wood etc., furniture	406.9	21.5	5.3	8113.8	12.6	0.2
34	Paper, print, publishing	1185.1	112.4	9.5	17732.0	117.4	0.7
35	Chemicals, petroleum, coal, rubber, plastics	978.6	67.3	6.9	14642.1	64.0	0.4
36	Non-met., minerals (except petroleum and coal)	217.8	8.8	4.0	2681.1	9.9	0.4
37	Basic metal industries	351.1	23.2	6.6	7242.2	81.0	1.1
38	Fabricated metal products, machinery and equipment	2576.1	81.9	3.2	44274.2	87.6	0.2
39	Other manufacturing	15.4	1.3	8.6	304.6	2.0	0.7
3	Total manufacturing	6473.4	352.0	5.4	111847.4	420.3	0.4

ISIC code	Production activity: manufacturing industry:	USA[14], 1991					
		Total investment	Pollution abatement capital investment		Value of shipments	Pollution abatement operating costs	
		million US$		%	million US$		%
31	Food, beverages, tobacco	9767.2	487.7	5.0	419632.6	1302.6	0.3
32	Textile etc., leather	2208.9	71.8	3.3	74848.1	259.6	0.3
33	Wood etc., furniture	2302.0	164.9	7.2	110596.2	434.6	0.4
34	Paper, print, publishing	14050.1	1269.8	9.0	285508.7	1863.1	0.7
35	Chemicals, petroleum, coal, rubber, plastics	26119.3	3610.3	13.8	551070.1	5952.5	1.1
36	Non-met., minerals (except petroleum and coal)	2381.3	154.4	6.5	59610.6	464.9	0.8
37	Basic metal industries	5878.7	673.4	11.5	132836.6	2002.6	1.5
38	Fabricated metal products, machinery and equipment	34663.5	944.8	2.7	1089628.0	3647.8	0.3
39	Other manufacturing	822.1	13.1	1.6	37131.4	74.9	0.2
3	Total manufacturing	98916.4	7390.1	7.5	2826207.0	17386.8	0.6

PART III

Pollution control capital expenditures for selected OECD countries (as percentage of total investments)

Because pollution abatement capital expenditures may vary over time, time series may give a more accurate picture of the costs of compliance. The following table gives such data for three selected countries: Japan, the Netherlands and the United States of America.

Year	Japan	Netherlands	USA
1986	3.6	3.8	3.7
1987	3.6	4.5	..
1988	4.1	4.1	4.2
1989	3.2	4.0	4.4
1990	3.2	5.9	5.9
1991	3.5	4.1	7.5
Average 1988-1991	3.5	4.5	5.5

Source: UNCTAD calculations based on the Japanese Ministry of International Trade and Industry "Trends of Industrial Pollution Prevention Investment in the Private Sector", various years; U.S. Department of Commerce, Economics and Statistics Administration, Bureau of the Census, "Pollution abatement costs and expenditures, 1991", January 1993; U.S. Department of Commerce, Bureau of the Census "1991 Annual survey of manufactures - Value of product shipments", November 1992; and Netherlands central bureau of statistics, "Industrial costs for the protection of the environment, 1991" (the Netherlands, Voorburg, 1993).

PART IV

Trade in products from sectors with high pollution abatement costs

The table presented below provides data on a sample of industries with relatively high pollution abatement costs, amounting to operating costs of 2 per cent or more of the value of shipments. As referred to in the report (TD/B/41(1)/4, section III.B.3), the sample is based on 1991 United States data at the four-digit Standard Industrial Classification (SIC) level.[15] The sample includes 22 SIC sectors and 109 corresponding standard international trade classification (SITC revision 2) sectors, representing some US$ 169 billion worth of OECD imports in 1991. The 109 SITC sectors are listed below.

Imports from the world and OECD in sectors with high pollution abatement costs as a share of total imports decreased from 1980-'82 to 1990-'92, while the shares of exports to the OECD originating in Latin America, Asia and countries with economies in transition, increased over the same period.

Trade in products from sectors with high pollution abatement costs - value and shares in total manufacturing exports of selected regions to OECD markets

(excluding intra-EU trade)

	Value (million US$)		Shares (in percent)							
	OECD		OECD		Japan		USA		EU	
	'80-82	'90-92	'80-82	'90-92	'80-82	'90-92	'80-82	'90-92	'80-82	'90-92
Exports \ to: from:										
OECD	61730.1	127920.6	14.3	12.8	18.4	15.4	13.5	11.5	17.7	15.1
DC	10945.2	27853.7	6.7	6.7	9.1	13.0	4.0	4.2	8.8	7.1
Latin America	4561.3	11517.6	9.6	13.3	33.6	46.7	5.8	8.1	12.3	18.6
Africa	2956.1	2706.8	16.1	9.5	48.7	47.7	9.6	1.4	16.1	10.0
Asia	3427.9	13629.2	3.5	4.5	5.5	9.5	1.9	2.6	3.7	3.8
CET	4020.3	10388.6	13.5	19.0	11.3	26.1	15.6	14.5	13.8	18.6
World	77781.7	169069.8	12.2	11.4	13.8	14.6	10.4	8.8	14.4	13.1

Source: UNCTAD Secretariat calculations based on data from U.S. Department of Commerce Economics and Statistics Administration, Bureau of the Census, "Pollution abatement costs and expenditures, 1991", January 1993 and U.S. Department of Commerce, Bureau of the Census "1991 Annual survey of manufactures - Value of product shipments", November 1992, and Comtrade data.

Notes:
DC: Developing countries, including China.
Latin America: Developing countries in Latin America and the Caribbean.
CET: Countries with economies in transition (former USSR and East European countries).
World: Excluding exports of products classified under "not elsewhere specified" (n.e.s.).

List of industries with high pollution abatement costs
SITC classification (revision 2)

SITC:	Description:	OECD imports 1991 (1,000 US$)
2331	SYNTH.RUBB.LAT.;SYNTH.RUBB.FACTICE DERIV.FROM OILS	1726294
2512	MECHANICAL WOOD PULP	442731
2516	CHEMICAL WOOD PULP,DISSOLVING GRADES	655899
2517	CHEMICAL WOOD PULP,SODA OR SULPHATE	9053284
2518	CHEMICAL WOOD PULP,SULPHITE	906417
2519	OTHER CELLULOSIC PULPS	303593
2671	REGENERATED FIBRES SUITABLE FOR SPINNING	625079
2672	WASTE OF MAN-MADE FIBRES,NOT CARDED,COMBED	74395
2786	SLAG,DROSS,SCALINGS AND SIMILAR WASTE,N.E.S.	240252
2881	ASH & RESIDUES,CONTAIN.METALS/METALLIC COMPOUNDS	1177720
3232	COKE AND SEMI-COKE OF COAL OF LIGNITE OR OF PEAT	750717
3352	MINERAL TARS AND PRODUCTS OF THEIR DISTILLATION	1239436
3353	PITCH & PITCH COKE OBTAIN.FROM COAL TAR/MINER.TARS	90933
3415	COAL GAS,WATER GAS,PRODUCER GAS & SIMILAR GASES	372
4313	FATTY ACIDS,ACID OILS,AND RESIDUES	284970
5112	CYCLIC HYDROCARBONS	1706429
5113	HALOGENATED DERIVATIVES OF HYDROCARBONS	1004082
5114	SULPHON.NITRAT./NITROSAT.DERIVATIV.OF HYDROCARBONS	181584
5121	ACYCLIC ALCOHOLS & THEIR HALOGENATED,DERIVATIVES	2563091
5122	CYCLIC ALCOHOLS & THEIR HALOGENATED DERIVATIVES	169136
5123	PHENOLS & PHEN.-ALCO.& THEIR HALOGENAT.DERIVATIVES	773775
5137	MONOCARBOXYLIC ACIDS & THEIR ANHYDRIDES,HALIDES,	1866623
5138	POLYCARBOXYLIC ACIDS & THEIR ANHYDRIDES,ETC.	987027
5139	CARBOXYLIC ACIDS WITH ALCOHOL,PHENOL ETC.FUNCTION	1647415
5145	AMINE-FUNCTION COMPOUNDS	1154855
5146	SINGLE OR COMPLEX OXYGEN-FUNCTION AMINO-COMPOUNDS	1922725
5147	CARBOXYAMIDE-FUNCTION COMPOUNDS;& OTHER COMPOUNDS	1631901
5148	OTHER NITROGEN-FUNCTION COMPOUNDS	4608173
5154	ORGANO-SULPHUR COMPOUNDS	856044
5155	OTHER ORGANO-INORGANIC COMPOUNDS	473176
5156	HETEROCYCLIC COMPOUNDS;NUCLEIC ACIDS	4991372
5157	SULPHONAMIDES,SULTONES AND SULTAMS	504695
5161	ETHERS,ALCOHOL PEROXIDES,ETHER PEROX.,EPOXIDES ETC	998361
5162	ALDEHYDE-,KETONE-,& QUINONE-FUNCTION COMPOUNDS	1130183
5163	INORGANIC ESTERS,THEIR SALTS,& THEIR DERIVATIVES	361594
5221	CHEMICAL ELEMENTS	1420553
5222	INORGANIC ACIDS AND OXYGEN COMPOUNDS OF NON-METALS	914249
5223	HALOGEN AND SULPHUR COMPOUNDS OF NON-METALS	74290
5224	METALLIC OXIDES OF ZINC,CHROMIUM,MANGANESE,IRON,	723305
5225	OTH.INORG.BASES & METALLIC OXID.,HYDROXID.& PEROX.	1971309
5231	METALLIC SALTS AND PEROXYSALTS OF INORGANIC ACIDS	1131833
5232	METALLIC SALTS AND PEROXYSALTS OF INORGANIC ACIDS	1554364
5233	SALTS OF METALLIC ACIDS, ETC.	370071
5239	INORGANIC CHEMICAL PRODUCTS,N.E.S	652033
5241	FISSILE CHEMICAL ELEMENTS AND ISOTOPES	4153292
5249	OTHER RADIO-ACTIVE AND ASSOCIATED MATERIALS	228049
5311	SYNTHETIC ORGANIC DYESTUFFS	3099613
5312	SYNTH.ORGANIC LUMINOPHORES;OPTIC.BLEACHING AGENTS	286604
5331	OTHER COLOURING MATTER,INORGANIC PRODUCTS	1084902
5335	COLOUR.PREPTNS OF A KIND USED IN CERAMIC,ENAMELLI.	949885
5622	MINERAL OR CHEMICAL FERTILIZERS,PHOSPHATIC	258833
5821	PHENOPLASTS	158770
5823	ALKYDS AND OTHER POLYESTERS	2674875

SITC	Description:	OECD imports 1992 (1,000 US$)
5824	POLYAMIDES	776409
5825	POLYURETHANES	349624
5826	EPOXIDE RESINS	530481
5827	SILICONES	441530
5829	OTHER CONDENSATION,POLYCONDENSATION/POLYADD.PRODU.	655126
5831	POLYETHYLENE	4036086
5832	POLYPROPYLENE	1404605
5833	POLYSTYRENE AND ITS COPOLYMERS	1536270
5834	POLYVINYL CHLORIDE	2197936
5835	COPOLYMERS OF VINYL CHLORIDE AND VINYL ACETATE	55214
5836	ACRYLIC POLYMERS,METHACRYLIC POLYMERS, ETC..	1219725
5837	POLYVINYL ACETATE	195405
5839	OTHER POLYMERIZATION AND COPOLIMERIZATION PRODUCTS	4506175
5842	CELLULOSE NITRATES	59890
5843	CELLULOSE ACETATES	113006
5849	OTHER CHEMICAL DERIVATIVES OF CELLULOSE,VULC.FIBR.	537119
5852	OTHER ARTIFICIAL PLASTIC MATERIALS,N.E.S.	247309
5911	INSECTICIDES PACKED FOR SALE ETC.	326742
5912	FUNGICIDES PACKED FOR SALE ETC.	465795
5913	WEED KILLERS (HERBICIDES)PACKED FOR SALE ETC.	859601
5914	DISINFECT.,ANTI-SPROUTING PROD.ETC.PACKED FOR SALE	220610
5981	WOOD- AND RESIN-BASED CHEMICAL PRODUCTS	469740
6411	NEWSPRINT	7537766
6413	KRAFT PAPER AND PAPERBOARD,IN ROLLS OR SHEETS	3471684
6415	PAPER AND PAPERBOARD,IN ROLLS OR SHEETS,N.E.S.	6735549
6416	BUILDING BOARD OF WOOD PULP OR OF VEGETABLE FIBRE	542803
6417	PAPER & PAPERBOARD,CORRUGATED,CREPED,CRINKLED ETC.	668394
6418	PAPER & PAPERBOARD,IMPREGNAT.COAT.SURFACE-COLOURED	4420480
6419	CONVERTED PAPER AND PAPERBOARD,N.E.S.	561612
6517	YARN OF REGENERATED FIBRES,NOT FOR RETAIL SAL	632595
6611	QUICKLIME,SLAKED LIME AND HYDRAULIC LIME	47308
6612	PORTLAND CEMENT,CIMENT FONDU,SLAG CEMENT ETC.	1038152
6635	SLAG WOOL,ROCK WOOL AND SIMILAR MINERAL WOOLS	333618
6649	GLASS,NE.ES.	972537
6712	PIG IRON,CAST IRON AND SPIEGELEISEN,IN PIGS,BLOCKS	806627
6713	IRON OR STEEL POWDERS,SHOT OR SPONGE	359052
6716	FERRO-ALLOYS	3982919
6724	PUDDLED BARS AND PILINGS;INGOTS,BLOCKS,LUMPS ETC.	149520
6725	BLOOMS,BILLETS,SLABS & SHEET BARS OF IRON OR STEEL	1999559
6727	IRON OR STEEL COILS FOR RE-ROLLING	3483520
6731	WIRE ROD OF IRON OR STEEL	1690143
6732	BARS & RODS,OF IRON/STEEL;HOLLOW MINING DRILL ST.	2480751
6733	ANGLES,SHAPES & SECTIONS & SHEET PILING,OF IRON/ST	1511660
6744	SHEETS & PLATES,ROLLED >4.75MM OF IRON/STEEL	2620800
6745	SHEETS & PLATES,RLD.THICKNS.3MM TO 4,75MM IRN/STL.	1209500
6746	SHEETS & PLATES,ROLLED;THICKNESS OF LESS THAN 3MM.	4029979
6747	TINNED SHEETS AND PLATES,OF STEEL	529213
6749	OTHER SHEETS AND PLATES,OF IRON OR STEEL,WORKED	3769001
6760	RAILS AND RAILWAY TRACK CONSTRUCTION MATERIAL	380880
6781	TUBES AND PIPES,OF CAST IRON	95414
6785	TUBE & PIPE FITTINGS(JOINTS,ELBOWS)OF IRON/STEEL	1708572
6794	CASTINGS OR IRON OR STEEL,IN THE ROUGH STATE	485719
6821	COPPER AND COPPER ALLOYS,REFINED OR NOT,UNWROUGHT	7711612
6841	ALUMINIUM AND ALUMINIUM ALLOYS,UNWROUGHT	9748225
7372	ROLLING MILLS,ROLLS THEREFOR AND PARTS	540327
7781	BATTERIES AND ACCUMULATORS AND PARTS	2798749

Source: UNCTAD secretariat, based on data from U.S. Department of Commerce op. cit. and Comtrade data.

PART V

Comparative advantage analysis

This part presents data on revealed comparative advantage indices (RCA) for the sample which was referred to in the report as a group of products identified with relatively high pollution abatement costs (amounting to operating costs of 2 per cent or more of the value of shipments, see also previous part of this annex). In addition, ex-post indicators of competitiveness for the products included in the sample are provided.

A. Revealed comparative advantage indices (RCA); analysis of trade in products from sectors with high pollution abatement costs

1980-1982 and 1990-1992

Region	No. of RCA		World		EU		Japan		USA	
	Upwards	Downwards	1980 - 1982	1990 - 1992	1980 - 1982	1990 - 1992	1980 - 1982	1990 - 1992	1980 - 1982	1990 - 1992
OECD	25	84	1.17	1.13	1.23	1.16	1.33	1.05	1.30	1.30
DC	85	24	0.55	0.59	0.61	0.55	0.66	0.89	0.38	0.48
LAC	86	23	0.79	1.17	0.86	1.42	2.43	3.20	0.55	0.91
Africa	69	36	1.32	0.84	1.12	0.76	3.52	3.26	0.92	0.15
Asia	80	29	0.29	0.40	0.25	0.29	0.39	0.65	0.18	0.30
CET	85	24	1.11	1.67	0.96	1.42	0.82	1.79	1.49	1.64

Source: UNCTAD secretariat calculations based on U.S. Department of Commerce op. cit. and Comtrade data.

Notes:
DC: Developing countries, including China.
LAC: Developing countries in Latin America and the Caribbean.
CET: Countries with economies in transition (former USSR and East European countries).

Algebraically the revealed comparative advantage index is defined as: $RCA_{ji}=(X_{ji}/X_{jt})/(X_{iw}/X_{wt})$ where x is export, j industry, i country, w world and t total. The revealed comparative advantage index gives an indication of a country's/region's export share of a given product in world trade of this product relative to this country's/region's export share in total world trade. An index above 1 is computed when the share of products from sectors with high pollution abatement costs in a country's/region's exports exceeds its share

in world trade and therefore indicates a comparative advantage in those exports. An index lower than 1 indicates a comparative disadvantage in the exports of products from sectors with high pollution abatement costs.

Trends in revealed comparative advantage indices were analysed. Disaggregated indices for the 109 SITC sectors included in the sample show that for a majority (84 out of 109), the RCA indices for OECD countries declined over the period 1980/82 to 1990/92, while that for developing countries increased for a relatively large number of such sectors (85 out of 109).

B. Competitiveness matrixes;

ex-post indicators of competitiveness

Market shares of products from sectors with high pollution abatement costs were analyzed over the period 1981-1991. The approach taken is based on the classification of products in four clusters[16]; two clusters indicating whether OECD trade in a specific product has been increasing or decreasing relative to the OECD's total imports (plotted from the horizontal axis of the matrices[17]) and, two clusters indicating whether or not a region's share in OECD imports of these products has been increasing (plotted from the vertical axis of the matrices[18]). On the basis of these criteria the classification of products from sectors with high pollution abatement costs was made:

- "Retreats" represent declining products in OECD trade in which a region's exports of products from sectors with high pollution abatement costs are losing their market share.
- "Waning stars" represent declining products in OECD trade in which a region's exports of products from sectors with high pollution abatement costs are gaining in market share.
- "Missed opportunities" represent increasing products in OECD trade in which a region's exports of products from sectors with high pollution abatement costs are losing their market share.
- "Rising stars" represent increasing products in OECD trade in which a region's exports of products from sectors with high pollution abatement costs are gaining in market share.

By attributing exports of products from sectors with high pollution abatement costs a product-specific combination of competitive position and market attractiveness (based on product and market share growth rates over the period 1981-1991) each product can be classified in one of the 4 categories. The matrixes, presented below, illustrate the distribution of these combinations for selected regions with each of the quadrants representing one of the four possible combinations mentioned above.

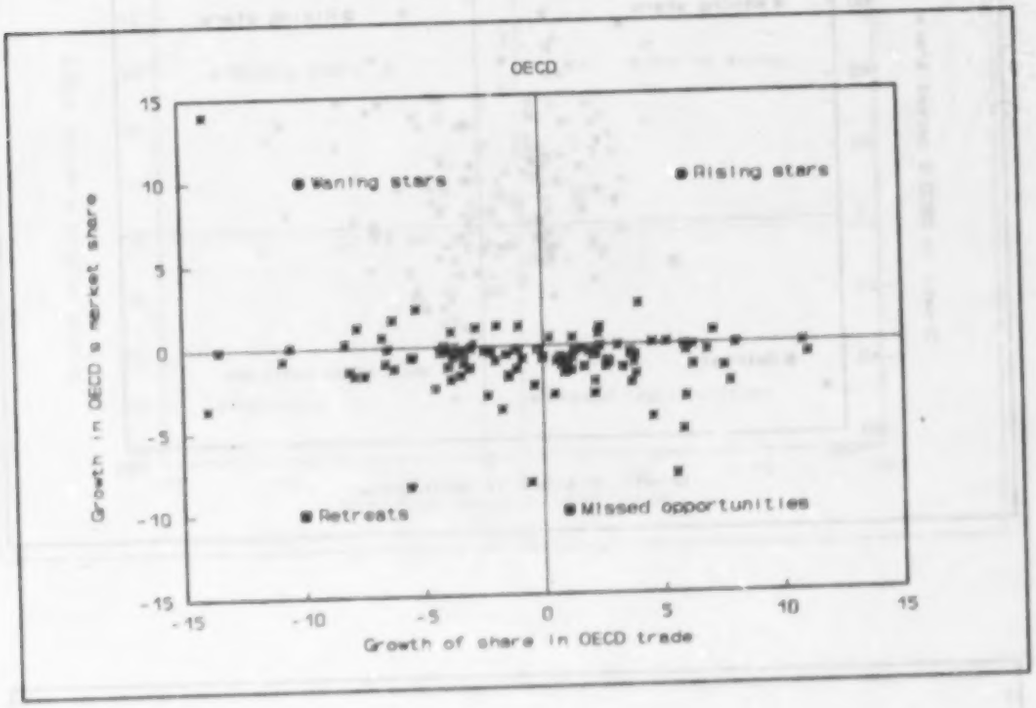
The matrixes show that for the group of developing countries, most products are grouped under rising and waning stars while for the OECD these products are characterized by a relatively low degree of competitiveness in markets of decreasing and increasing demand.

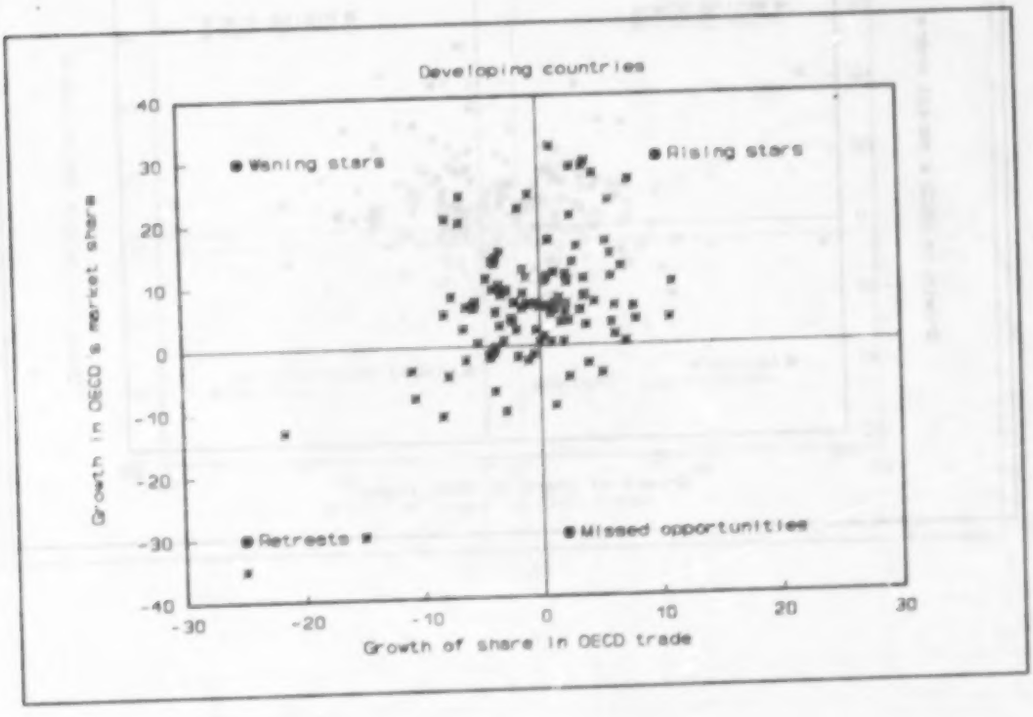
The "pie charts" indicate, for the year 1991, the amount of trade in products from sectors with high pollution abatement costs classified in each of the four groups as a percentage share of each region's total exports of these products to the OECD. For the group of developing countries, trade in products from sectors with high pollution abatement costs is more concentrated in the competitive sectors while most of the OECD trade is associated with retreats and missed opportunities.

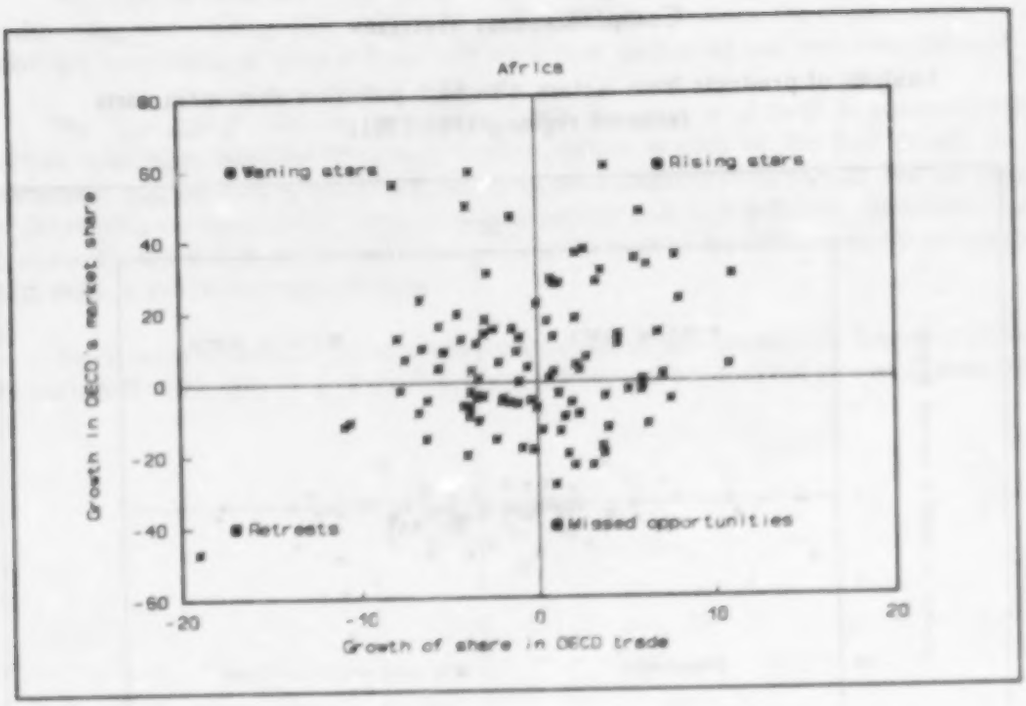
Since competitiveness is determined by a number of non-quantifiable factors it should be realized that this type of analysis reveals competitiveness but does not give an explanation.

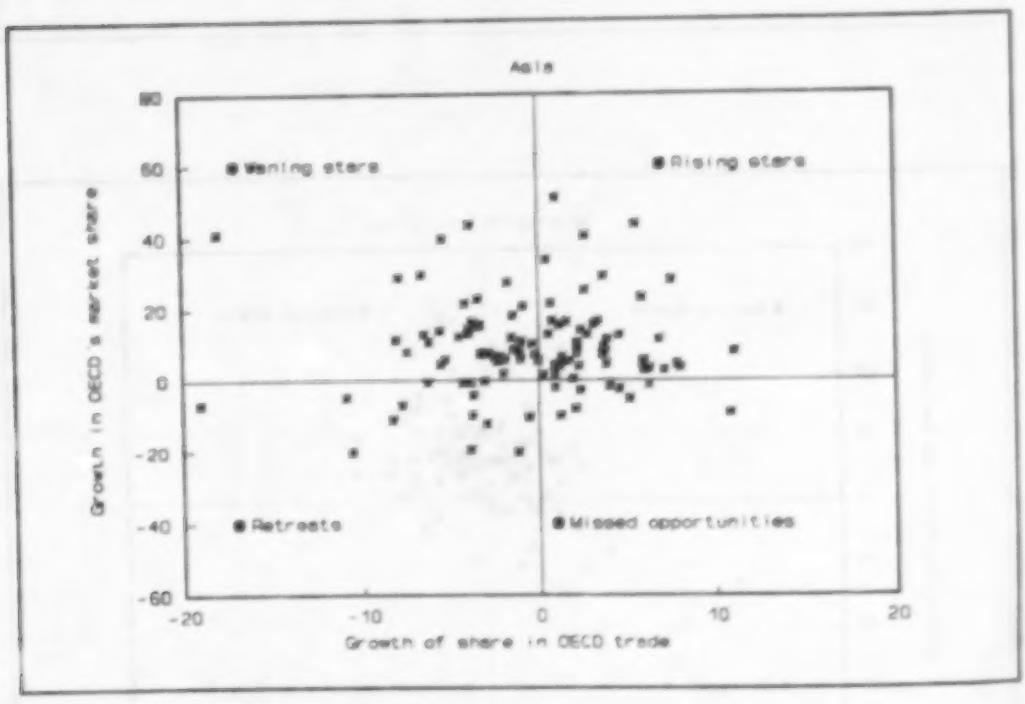
Competitiveness Matrixes

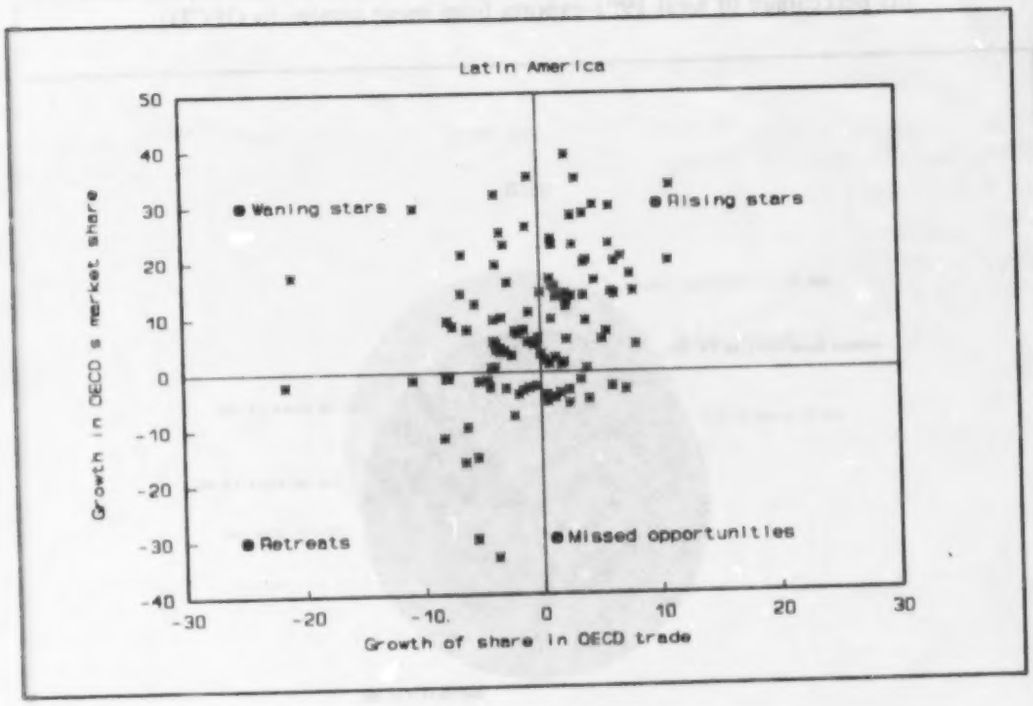
Analysis of products from sectors with high pollution abatement costs (selected regions, 1981-1991)

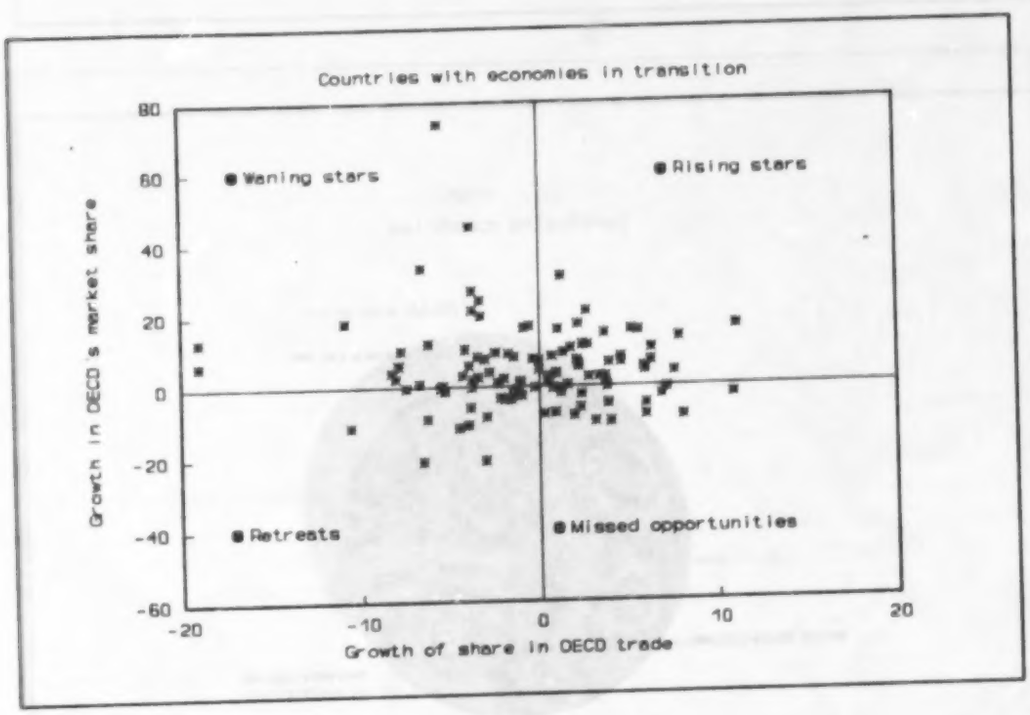





Africa
Waning stars
Rising stars
Retreats
Missed opportunities
Growth in OECD's market share
Growth of share in OECD trade
80
60
40
20
0
-20
-40
-60
-20
-10
0
10
20

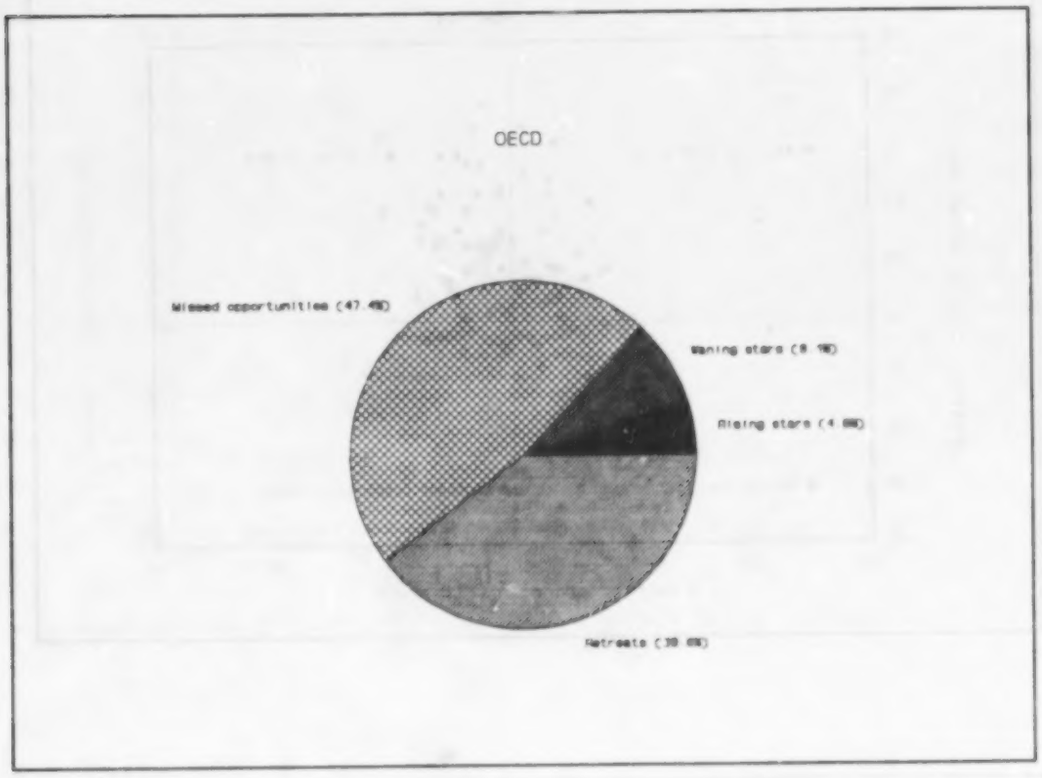

Asia
Waning stars
Rising stars
Retreats
Missed opportunities
Growth in OECD's market share
Growth of share in OECD trade
80
60
40
20
0
-20
-40
-60
-20
-10
0
10
20

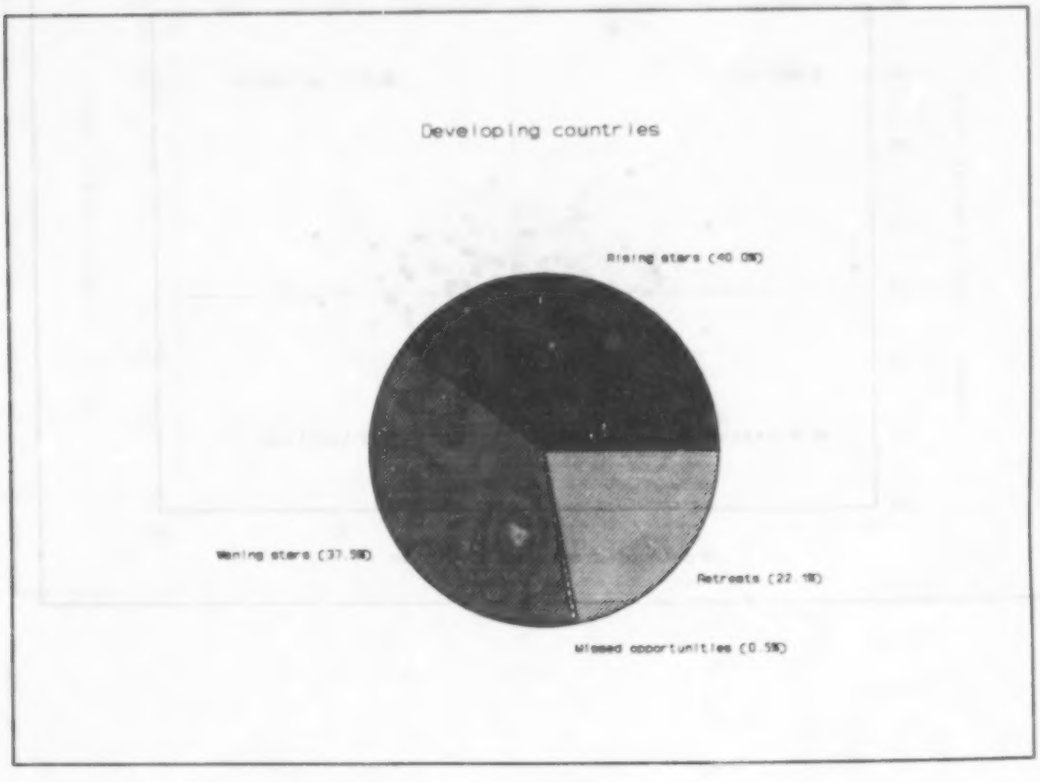

Latin America
Growth in OECD s market share
Growth of share in OECD trade
Waning stars
Rising stars
Retreats
Missed opportunities
50
40
30
20
10
0
-10
-20
-30
-40
-30
-20
-10
0
10
20
30

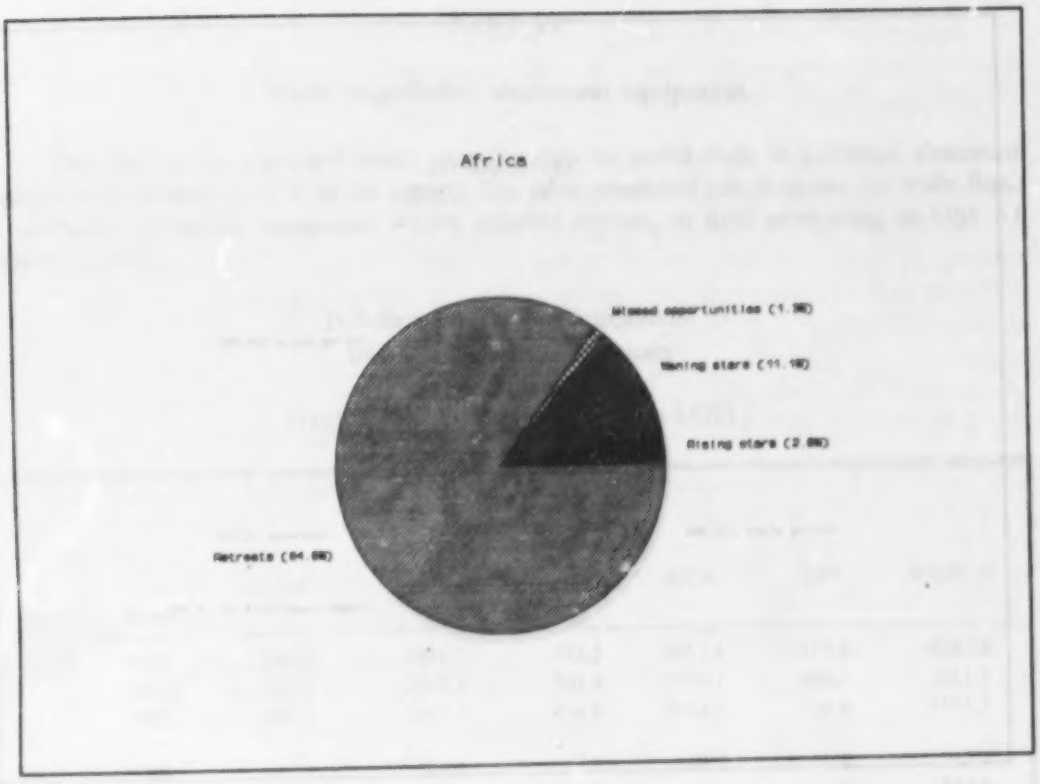

Countries with economies in transition
Growth in OECD s market share
Growth of share in OECD trade
Waning stars
Rising stars
Retreats
Missed opportunities
80
60
40
20
0
-20
-40
-60
-20
-10
0
10
20

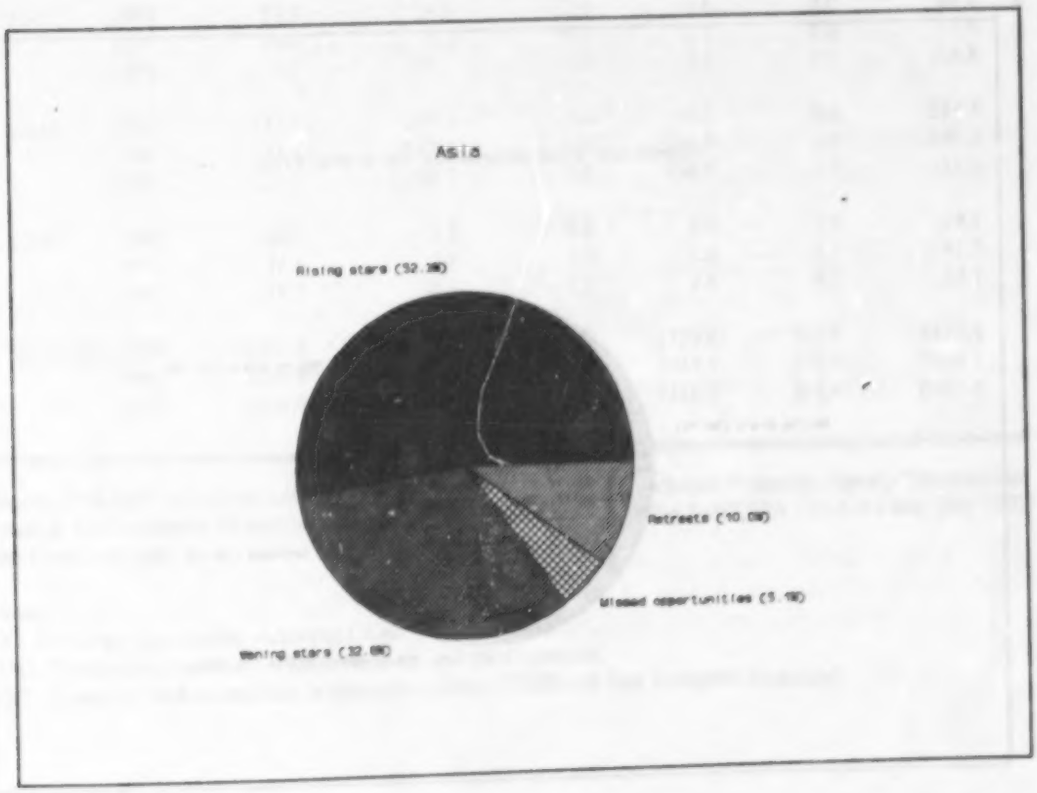
Competitiveness Matrixes: Percentage shares, 1991

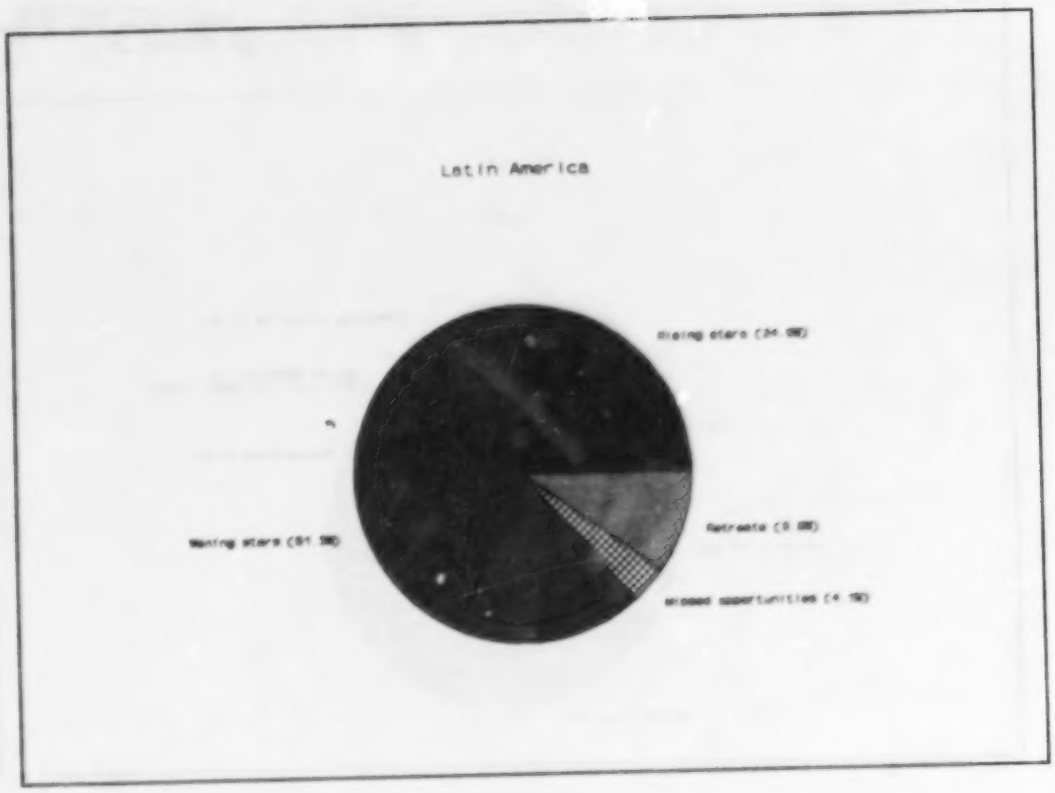
Relative importance of exports from sectors with high pollution abatement costs
(as percentage of total 1991 exports from these sectors to OECD)

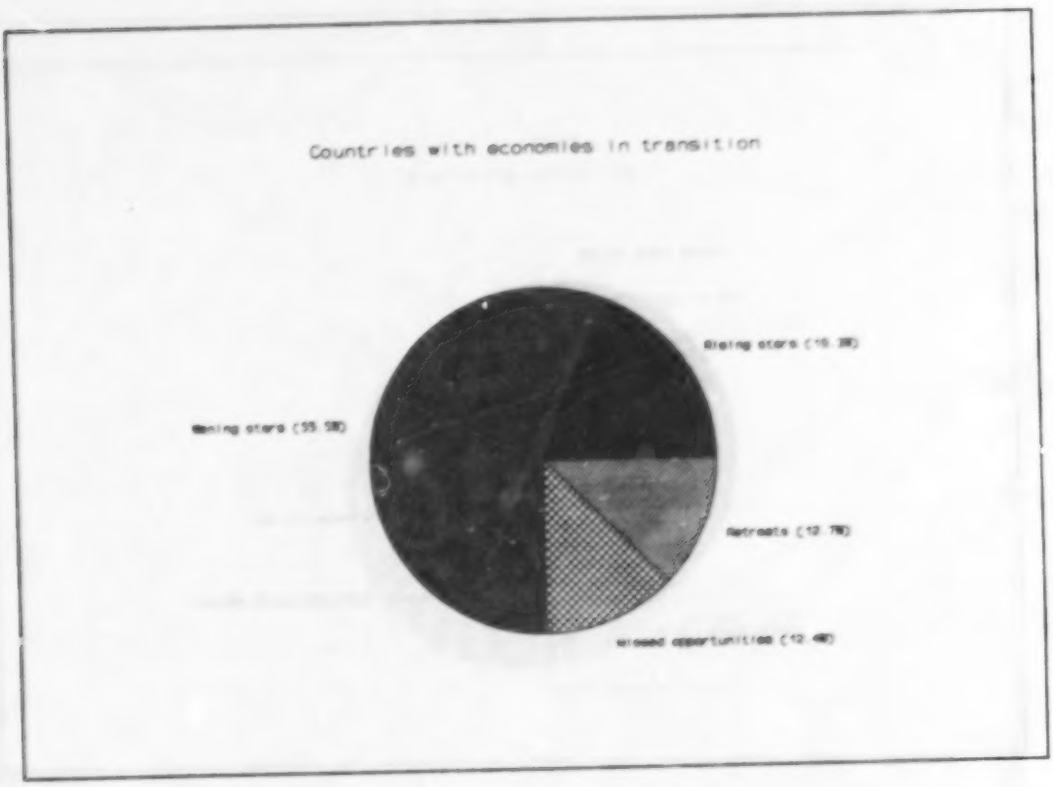





Africa
Missed opportunities (1.9%)
Waning stars (11.1%)
Rising stars (2.8%)
Retreats (84.0%)


Asia
Rising stars (52.3%)
Retreats (10.0%)
Missed opportunities (5.1%)
Waning stars (32.6%)


Latin America
Rising stars (24.0%)
Retreats (9.0%)
Missed opportunities (4.0%)
Rising stars (61.0%)


Countries with economies in transition
Rising stars (19.0%)
Rising stars (55.0%)
Retreats (12.0%)
Missed opportunities (12.0%)

PART VI

Trade in pollution abatement equipment

This part of the statistical annex provides data on world trade in pollution abatement equipment (see section IV.B of the report). The table presented below shows the trade flows in pollution abatement equipment among selected regions, in total amounting to US$ 6.6 billion in 1992.

Pollution Abatement Equipment-
trade among selected regions

(excluding intra-EU trade, million US$)

		Imports					
Exports:	Year	DMEC	DC	LAC	ASIA	CET	WORLD
DMEC	1990	2880.4	1891.2	273.2	1617.8	311.8	5083.4
	1991	3133.4	2103.7	303.9	1799.1	274.2	5511.3
	1992	3303.2	2447.5	433.9	2013.5	351.0	6101.7
DC	1990	187.7	124.4	14.0	108.2	0.1	312.2
	1991	170.4	164.4	16.6	146.4	3.0	337.8
	1992	218.2	237.9	37.2	200.4	2.7	458.8
LAC	1990	53.5	14.5	12.9	1.6	0.0	68.0
	1991	39.6	16.3	14.1	2.2	0.0	55.9
	1992	73.7	33.1	30.8	2.2	0.0	106.8
ASIA	1990	123.7	109.5	1.0	106.3	0.1	233.3
	1991	123.1	147.3	2.0	144.0	2.8	273.2
	1992	131.7	198.7	3.6	194.9	2.7	333.1
CET	1990	23.7	4.2	0.8	3.4	1.9	29.8
	1991	34.6	5.7	3.9	1.6	0.7	41.0
	1992	28.5	4.1	1.2	2.8	9.7	42.3
WORLD	1990	3091.8	2019.8	288.0	1729.4	313.8	5425.4
	1991	3338.4	2273.8	324.4	1947.1	277.9	5890.1
	1992	3550.0	2689.4	472.3	2216.7	363.4	6602.8

Source: UNCTAD secretariat calculations based on United States Environmental Protection Agency "International Trade in Environmental Protection Equipment - An Assessment of Existing Data" EPA 230-R-93-006, July 1993 and Comtrade data.

Notes:
DC: Developing countries, including China.
LAC: Developing countries in Latin America and the Caribbean.
CET: Countries with economies in transition (former USSR and East European countries).

It should be noted that it is difficult to give an accurate estimate of trade in pollution abatement equipment, particularly since trade classification systems do not conform well with statistics on pollution abatement equipment.

In a recent study by the United States Environmental Protection Agency, pollution abatement equipment was classified under tariff codes which consisted predominantly of this type of equipment.[19] On the basis of this classification, the UNCTAD secretariat converted national tariff lines to harmonized system (HS) codes. Subsequently, a concordance was drawn up with corresponding SITC codes, revision 3. The HS and corresponding SITC codes are listed below.

HS codes	SITC rev. 3	Product description of HS codes:
841780	74138	Industrial or lab furnaces & ovens, inc. incinerators non electric.
842139	74369	Filtering or purifying machinery and apparatus for gases nes.
902710	87441	Gas or smoke analysis apparatus.
842121	74361	Filtering or purifying machinery and apparatus for water.
842129	74367	Filtering or purifying machinery and apparatus for liquids nes.
842199	74395	Parts for filtering or purifying machinery & apparatus for liquids or gases.

The main limitation of these data is that most trade categories include non environmental goods besides the environmental goods. This leads, on the one hand, to over-reporting by including products that are not used by industry for environmental purposes. On the other hand, by leaving out certain categories it leads to under-reporting. Also, it should be realized that the classification does not include trade in "clean technologies" that prevent pollution rather than control it. Similarly, the analysis does not include environmental services nor pollution prevention devices that are "embodied" in traded products (e.g. catalytic converters for cars).[20]

Notes:

1. Varying definitions of pollution abatement and control expenditures among countries complicate a country specific comparison of these statistics (see also "OECD Environmental data, Compendium 1993").

2. Only former Federal Republic of Germany.

3. Due to insufficient data, the distinction between public and private sector environmental investment is not clear for these countries. China's environmental investments are expressed as a percentage of GNP. Due to lack of information, the UNCTAD secretariat estimated the years for which data is given.

4. Data collection was carried out in collaboration with the International Environmental Data Service (IEDS) of the United Nations Economic Commission for Europe (ECE) who contacted national statistical offices and organised the data collection and presentation of the tabels on pollution abatement costs and capital expenditures for the manufacturing industries (ISIC Rev.2) of five selected developed market economies; Canada, France, Germany, the Netherlands and Sweden. On the basis of national statistical information sources, the UNCTAD secretariat estimated the pollution abatement costs of three additional countries: Australia, Japan and the United States.

5. See also: U.S. Congress, Office of Technology Assessment, "Industry, Technology, and the Environment-Competitive Challenges and Business Opportunities", 1994, Appendix 7-A: Possible sources of under-reporting of pollution abatement costs.

6. OECD, "Pollution Abatement and Control Expenditure in OECD Countries", OECD Environment Monographs No. 75, OCDE/GD (93)91, Paris 1993.

7. Source: UNCTAD calculations on the basis of Australian Bureau of Statistics, "Cost of environment protection, Australia - Selected industries, 1990-91", ABS Catalogue No. 4403.0, and; OECD, Industrial Statistics, 1992.

Australian statistics on environmental and total expenditures do not use the ISIC classification of manufacturing industries. The UNCTAD secretariat estimated the expenditures corresponding to ISIC headings on the basis of the data derived from national statistics.

8. For Canada, total environmental expenditures (investments and current) are calculated as the sum of expenditures on air & climate, waste-water and soil & groundwater. ISIC heading 34 only includes the pulp and paper industry and ISIC heading 35 only includes petroleum, coal and chemicals.

9. Source for total investments and production: OECD, Industrial Structure Statistics, 1992.

10. Source for total investments and production: OECD, Industrial Structure Statistics, 1992.

11. Source: Japanese Ministry of International Trade and Industry "Investment trends in plants and equipment in major industries" (UNCTAD translation), Heisei 5, 1993.

Japanese statistics on environmental and total expenditures are not expressed in the ISIC classification of manufacturing industries. The UNCTAD secretariat estimated the expenditures corresponding to ISIC headings on the basis of the data derived from national statistics.

12. Source: For total investments and production: OECD, Industrial Structure Statistics, 1992.

13. Data for the table of Sweden is based on information of industrial establishments with a yearly average number of employers greater than 10 persons.

14. Source: UNCTAD calculations, on the basis of: U.S. Department of Commerce Economics and Statistics Administration, Bureau of the Census, "Pollution abatement costs and expenditures, 1991", January 1993 and U.S. Department of Commerce, Bureau of the Census "1991 Annual survey of manufactures - Value of product shipments", November 1992.

15. Data obtained from U.S. Department of Commerce op. cit.

16. Mandeng, O.J. "International competitiveness and specialization", CEPAL Review No. 45, December 1991.

17. Algebraically this is defined as: product share$_j$=(M_{jw}/M_{tw}) where M is import, j is product, t is total, w is the market, i.e. OECD.

18. Algebraically this is defined as: market share$_j$=(M_{ji}/M_{jw}) where M is import, j is product, i is region, w is the market, i.e. OECD.

19. United States Environmental Protection Agency "International Trade in Environmental Protection Equipment - An Assessment of Existing Data" EPA 230-R-93-006, July 1993.

20. United States Environmental Protection Agency op. cit.